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SERIES Q: SWITCHING AND SIGNALLING
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Interface Recommendation for Intelligent Network Capability Set 4: SCF-SCF interface

ITU-T Recommendation Q.1248.6

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ITU-T Recommendation Q.1248.6

Interface Recommendation for Intelligent Network Capability Set 4: SCF-SCF interface

Summary

The Q.1248.x family of ITU-T Recommendations defines the Intelligent Network (IN) Application Protocol (INAP) for IN Capability Set 4 (IN CS-4). This definition is based upon IN CS-3 ITU-T Q.1238 (2000) and upon the general rules for INAP provided in ITU-T Q.1208, and is consistent with the scope of IN CS-4 as defined in ITU-T Q.1241.

Within the Q.124.x series of ITU-T Recommendations, the Q.1248.x family of ITU-T Recommendations describes the protocol realizing the Q.1241 Distributed Functional Plane in a service and vendor implementation independent manner, as constrained by the capabilities of the embedded base of network technology. This provides the flexibility to allocate distributed functionality into multiple physical network configurations and to evolve IN from IN CS-4 to some future CS-N.

This Recommendation belongs to the Q.1248.x family of ITU-T Recommendations for IN Capability Set 4. It covers the SCF-SCF interface including the description of the aspects of the SCF Functional Entity which are relevant to this interface.

This Recommendation includes an electronic attachment containing Annex A, ASN.1 definitions.

Source

ITU-T Recommendation Q.1248.6 was prepared by ITU-T Study Group 11 (2001-2004) and approved under the WTSA Resolution 1 procedure on 13 July 2001.

Keywords

Intelligent Network, INAP

FOREWORD

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ITU-T Recommendation Q.1248.6

Interface Recommendation for Intelligent Network Capability Set 4: SCF-SCF interface¹

1 Scope

This Recommendation belongs to the Q.1248.x family of ITU-T Recommendations for IN Capability Set-4. It specifies the protocol on the SCF-SCF interface and provides a description of the aspects of the SCF Functional Entity which are involved in the realization of this interface.

2 References

All ITU-T Recommendations and other documents referred to in this text are identified in ITU-T Q.1248.1.

3 Abbreviations and acronyms

All abbreviations and acronyms used in this text are defined in ITU-T Q.1248.1.

4 SCF-SCF relationship

This SCF-SCF relationship is used for information exchange between two SCFs in the public network. The relationship supports call-related operations, which can be for intranetwork or internetwork purposes.

The SCF-SCF relationship supports the exchange of information between services during call processing. The SCF-SCF relationship is also one of a limited set of relationships to support internetworking. As such, it provides a point of interconnection to the network, effectively hiding the specific structure of the network and providing access security to the network from other public networks.

The SCF-SCF relationship is used for various purposes. Each of these purposes can apply to the intranetwork, or internetwork cases. Specifically, the relationship is used for the following:

- a) **Distribution of Service Logic** between SCFs. It is possible that a given SCF may only contain a service logic program to complete part of a service, such as Customized Call Routing. Service completion may rely on the outcome of service logic in another SCF to be performed. This will require coordination and synchronization between the SCFs and may be provided by explicit, solicited notifications.

In case of error situations, generic error indications returned locally (within the same network) to the SCF by its associated SDF may be interpreted to service specific denial causes by the SCF of that network and can be sent as such to the SCF of the interconnecting network.

- b) **Unsolicited Notifications** of events taking place within the domain of a given SCF are provided to other SCFs in an unsolicited manner. For example, after an internetwork handover when the initial network provides the anchor point, subsequent handovers may require notifications to the initial network to optimize internetwork connections.

¹ This Recommendation includes an electronic attachment containing Annex A, ASN.1 definitions.

5 SCF FE model

The SCF Function Entity overall model is described in ITU-T Q.1248.1. Figure 1 highlights the main components of this model.

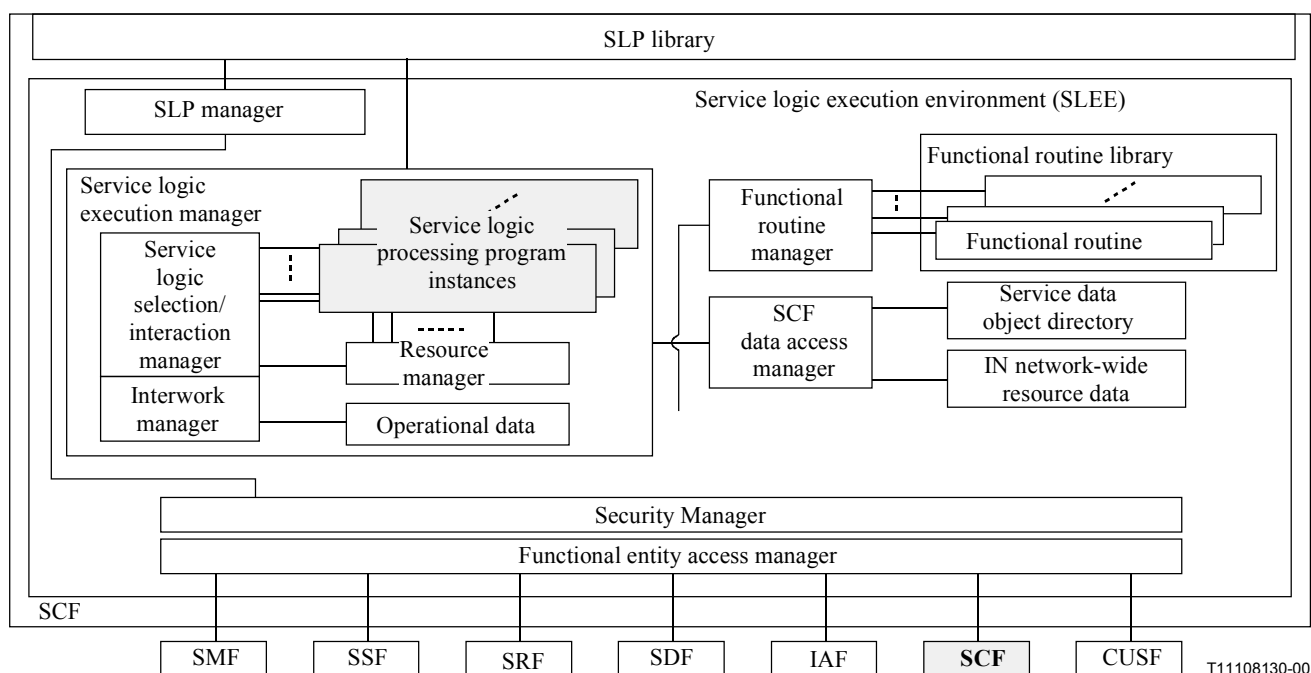


Figure 1/Q.1248.6 – SCF FE model

6 SCF FSM

The SCF FSM overall model is described in ITU-T Q.1248.1. Figure 2 highlights the main components of this model which are involved in the SCF-SCF relationship. These are:

- the Functional Entity Access Manager (FEAM), as defined in ITU-T Q.1248.1;
- the SCME-Control, as defined in ITU-T Q.1248.1;
- the SCME-FSM, which handles the traffic flow control procedures;
- the SCSM-SCF, which supports the procedures that are specific to this relationship.

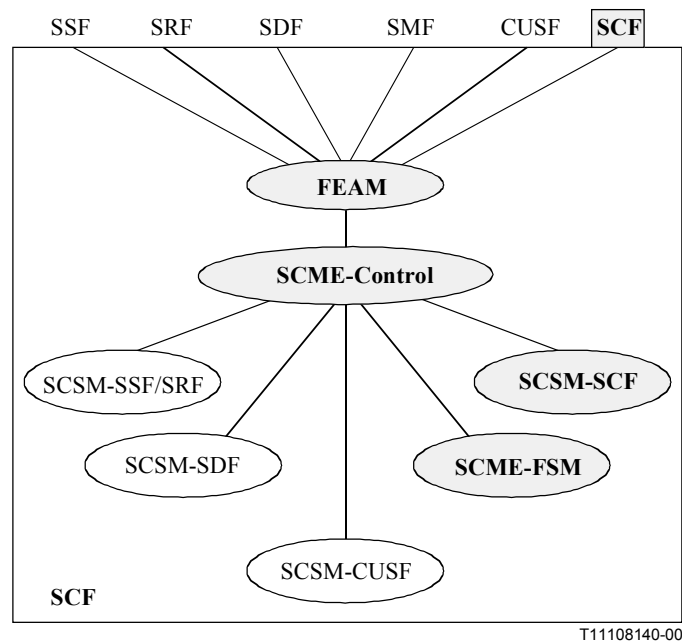


Figure 2/Q.1248.6 – SCF FSM model

The interaction with another SCF is possible from any state of the invoking SCF. In the following subclauses, the SCF-related states are specified. The models describe the relationship of one SCF with another SCF on both sides of the relationship. If an SCF needs to access another SCF, a new FSM of type SCSM-SCF should be instantiated.

There are four different types of SCSM-SCF instances.

- Instances of type SCSM-Sup and SCSM-Con handle the interactions between SCFs, for the supporting and controlling role respectively.
- Instances of type SCSM-ChI and SCSM-ChT handle the interactions between SCFs, for chaining initiation and termination.

In what follows, the states and events associated with each of these types of FSMs are described.

6.1 SCME FSM

The SCME-FSM is either a TFC Initiator finite state model or a TFC Responder finite state model.

6.1.1 State transition model for TFC Initiator-related states

The TFC Initiator finite state model (FSM) which is located in SCME-FSM is depicted in Figure 3.

Figure 3

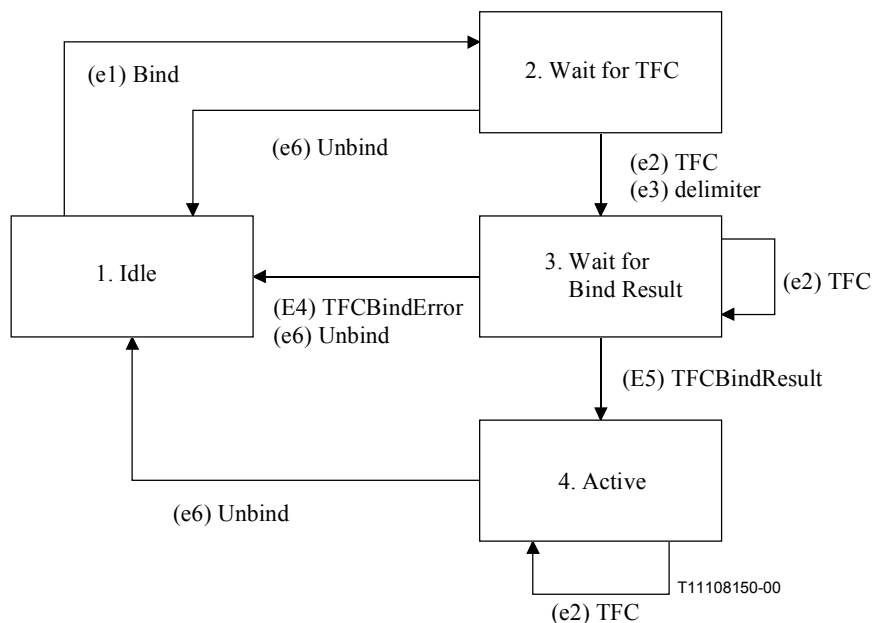


Figure 3/Q.1248.6 – State model for TFC initiator

Each state is discussed in one of the following subclauses. General rules applicable to more than one state are as follows:

In any state, if the dialogue with the Responder is terminated, then the TFC Initiator FSM returns to "Idle" state after ensuring that any resources allocated to the dialogue have been de-allocated.

6.1.1.1 State 1: "Idle"

This state is the initial state for the FSM after it has been created by the FE message management. The only event accepted in this state is:

- (e1) Bind: On receipt of this event the FSM constructs a **TFCBind** operation. This event causes a transition out of this state to State 2, "Wait for TFC".

6.1.1.2 State 2: "Wait for TFC"

In this state, a Bind request has been received from the Application and a **TFCBind** operation has been constructed, but not sent. Three events are considered in this state:

- (e2) TFC: This event causes a **TrafficFlowControl** operation to be constructed. The **TFCBind** and **TrafficFlowControl** operations are sent to the remote TFC Responder FSM and the event causes a transition out of this state to State 3, "Wait for Bind Result";
- (e3) delimiter: This event causes the constructed **TFCBind** operation to be sent to the remote TFC Responder FSM and the event causes a transition out of this state to State 3, "Wait for Bind Result"; and
- (e6) Unbind: This event causes the constructed **TFCBind** operation to be discarded and causes a transition out of this state to State 1, "Idle".

6.1.1.3 State 3: "Wait for Bind Result"

In this state, the following events are considered:

- (e2) TFC: This event causes the FSM to save the event to be processed after a transition to another state occurs. The FSM remains in the same state;
- (E4) TFCBindError: This event causes the FSM to notify the Application that the association establishment failed and causes a transition out of this state to State 1, "Idle";
- (E5) TFCBindResult: This event causes the FSM to notify the Application that the association establishment succeeded and transitions out of this state to State 4, "Active"; and
- (e6) Unbind: This event causes the FSM to construct and send an **IN-Unbind** to the remote TFC Responder FSM and causes a transition out of this state to State 1, "Idle".

6.1.1.4 State 4: "Active"

In this state, The following events are considered in this state:

- (e2) TFC: This event causes a **TrafficFlowControl** operation to be constructed and sent to the remote TFC Responder FSM. The FSM remains in the same state; and
- (e6) Unbind: This event causes the FSM to construct and send an **IN-Unbind** to the remote TFC Responder FSM and causes a transition out of this state to State 1, "Idle".

6.1.2 State transition model for TFC Responder-related states

The TFC Responder finite state model (FSM) is depicted in Figure 4.

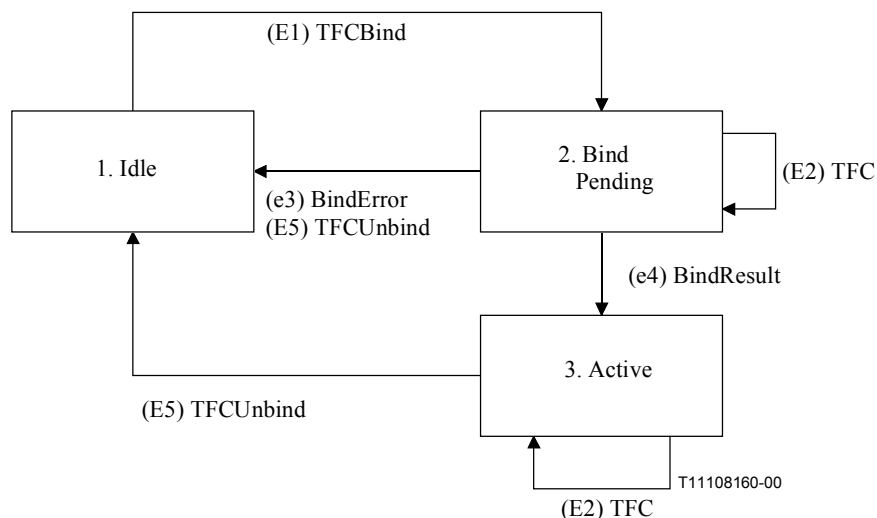


Figure 4/Q.1248.6 – State model for TFC responder

Each state is discussed in one of the following subclauses.

General rules applicable to more than one state are as follows:

In any state, if the dialogue with the Responder is terminated, then the TFC Responder FSM returns to "Idle" state after ensuring that any resources allocated to the dialogue have been de-allocated.

6.1.2.1 State 1: "Idle"

This state is the initial state for the FSM after it has been created by the FE message management. The only event accepted in this state is:

- (E1) TFCBind: This event causes the FSM to notify the Application that a TFC association has been requested by a remote TFC Initiator FSM and causes a transition out of this state to State 2, "Bind Pending".

6.1.2.2 State 2: "Bind Pending"

The following events are considered in this state:

- (E2) TFC: This event causes the FSM to save the event to be processed after a transition to another state occurs. The FSM remains in the same state;
- (e3) BindError: This event causes the FSM to construct a **tfcBindError** error message and sends it to the remote TFC Initiator FSM and causes a transition out of this state to State 1, "Idle";
- (e4) BindResult: This event causes the FSM to construct a **tfcBindResult** message and sends it to the remote TFC Initiator FSM and causes a transition out of this state to State 3, "Active";
- (E5) TFCUnbind: This event causes the FSM to notify the Application that the association has been terminated by an **IN-Unbind** operation from the remote TFC Initiator FSM and causes a transition out of this state to State 1, "Idle".

6.1.2.3 State 3: "Active"

The following events are considered in this state:

- (E2) TFC: This event causes the FSM to notify the Application of the need to process a new traffic flow control request from the remote TFC Initiator FSM. The FSM remains in the same state; and
- (E5) TFCUnbind: This event causes the FSM to notify the Application that the association has been terminated by an **IN-Unbind** operation from the remote TFC Initiator FSM and causes a transition out of this state to State 1, "Idle".

6.2 Controlling SCF FSM (SCSM-Con)

The Finite State Machine for an SCF interacting with another SCF when acting as a controlling SCF is depicted in Figure 5.

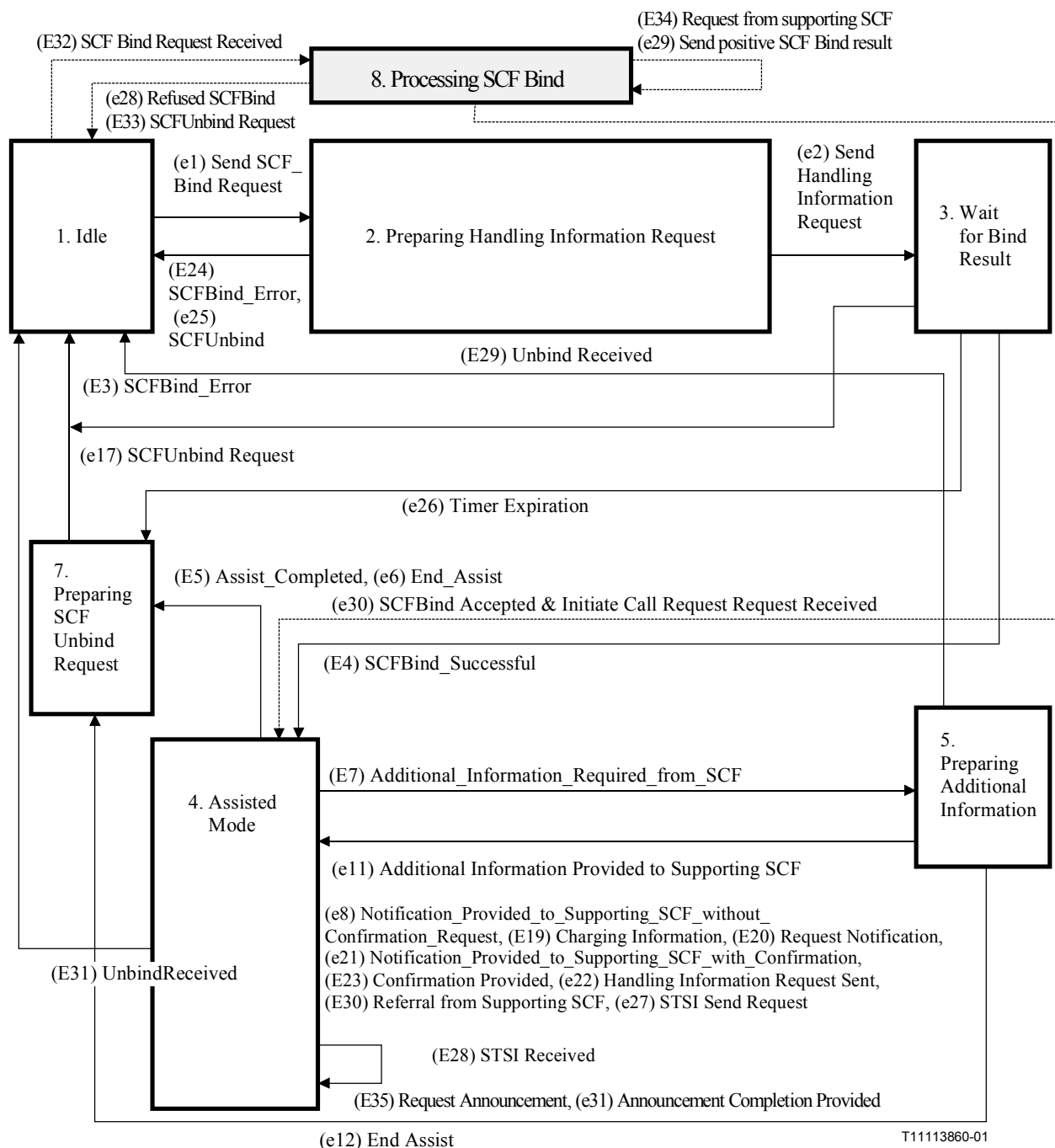


Figure 5/Q.1248.6 – SCSM-Con (Controlling SCF FSM)

6.2.1 State 1: "Idle"

The following event is considered in this state:

- (e1) Send SCF Bind_Request: This is an internal event, caused by the need of the service logic to establish a relationship with another SCF and to receive cooperation from it, to further proceed with a call. This event causes a transition to State 2, "Preparing Handling Information Request". It causes SCFBind operation to be issued to the supporting SCF.
- (E32) SCF Bind Request Received: This is an external event caused by the reception of an SCFBind operation from the supporting SCF for creating and processing a call. This event causes a transition out of this state to State 8, "Processing SCF Bind".

6.2.2 State 2: "Preparing Handling Information Request"

In this state, the SCF is preparing a request to the supporting SCF to be assisted in the processing of the call. The following events are considered in this state:

- (e2) Send Handling Information Request: It causes a Handling Information request operation to be sent to the supporting SCF. A TransferSTSI operation may also be sent simultaneously. This event causes a transition to State 3, "Waiting for Bind Result".
- (E24) SCFBind_Error: This is an external event caused by SCFBind operation error reception. It causes a transition back to State 1, "Idle".
- (e25) SCFUnbind: This is an internal event causing sending of IN-Unbind (e.g. because the SCFBind result timer is expired). It causes a transition back to State 1, "Idle".

6.2.3 State 3: "Waiting for Bind Result"

In this state, the SCF is awaiting the result to Bind request. The following events are considered in this state:

- (E3) SCFBind_Error: This is an external event caused by the reception of the error result of the previously issued SCFBind operation. It causes a transition back to State 1, "Idle".
- (E4) SCFBind_Successful: This is an external event caused by the reception of the successful result of the previously issued SCFBind operation. It causes a transition to State 4, "Assisted Mode".
- (e26) Timer Expiration: This is an internal event caused by the expiration of a guard timer. It causes a transition back to State 7, "Preparing SCF Unbind Request".

6.2.4 State 4: "Assisted Mode"

In this state, the SCF has sent a request to the supporting SCF to be assisted in the processing of the call. A relationship has been created between the two SCFs. They are cooperating to provide functionalities needed to process a call. The following events can occur in this state:

- (E5) Assist_Completed: This is an external event caused by the reception of the result of a previously issued operation. The result indicates that the SCF can continue with the processing of the call and that the assistance of an assisting SCF is not further required. This event causes a transition to the State 7, "Preparing SCF Unbind Request"; unless there is a result pending, in which case it stays in State 4, pending the receipt of the requested result. This event is caused by a reception of the following operation:
 - HandlingInformationResult.
- (e6) End_Assist: This is an internal event caused by the need of the service logic to stop its relationship with the supporting service logic. This event causes a transition to State 7, "Preparing SCF Unbind Request".
- (E7) Additional_Information_Required_from_SCF: This is an external event caused by the reception of an operation from the supporting SCF requesting additional information to be able to assist the controlling SCF. This event causes a transition out of this state to State 5, "Preparing Additional Information". This event is caused by the reception of one of the following operations:
 - ProvideUserInformation.
 - NetworkCapability.
 - RunUserScript.

- (e8) Notification_Provided_to_Supporting_SCF_without_Confirmation_Request: This is an internal event caused by the need of the service logic to provide notification for the supporting SCF without the confirmation request. This event causes a transition to the same state, State 4 , "Assisted Mode". It causes one of the following operations to be issued to the supporting SCF:
 - NotificationProvided;
 - ReportChargingInformation.
- (e21) Notification_Provided_to_Supporting_SCF_with_Confirmation: This is an internal event caused by the need of the service logic to provide notification for the supporting SCF with the confirmation request. The controlling SCF waits the confirmation from the supporting SCF and this event causes a transition to the same state, "Assisted Mode". It causes one of the following operations to be issued to the supporting SCF:
 - ConfirmedReportChargingInformation;
 - ConfirmedNotificationProvided.
- (e22) Handling Information Request sent: This is an internal event caused by the need of the service logic, having received the previously requested HandlingInformationResult or InitiateCallRequest, to request additional information to the supporting SCF. It causes the following operation to be issued to the supporting SCF:
 - HandlingInformationRequest.

The controlling SCF awaits the response from the supporting SCF, and this event does not cause any transition out of this state.
- (e31) Announcement Completion Provided: This is an internal event caused by the need of the service logic to notify the supporting SCF of the completion of announcements. It causes an AnnouncementCompletionReport operation to be sent to the supporting SCF. This event causes a transition to the same state, State 4, "Assisted Mode".
- (E23) Confirmation Provided: This is an external event caused by the reception of one of the following operation results:
 - Result of ConfirmedReportChargingInformation;
 - Result of ConfirmedNotificationProvided.

It does not cause any transition out of this state.
- (E19) Charging Information: This is an external event caused by the reception of the EstablishChargingRecord operation. It does not cause any transition out of this state.
- (E20) Request Notification: This is an external event caused by the reception of the RequestNotification operation. It does not cause any transition out of this state.
- (E30) Referral from Supporting SCF: This is an external event cause by the reception of a Referral error as the response to the HandlingInformationRequest operation. This event is communicated to the internal service logic and does not cause a state transition out of this state.
- (e27) STSI Send Request: This is an internal event caused by the need of the service logic to request additional service information from the supporting SCF or to respond to the requested additional service information to the Supporting SCF. It causes the following operation to be sent to the Supporting SCF:
 - TransferSTSI.

This internal event will not cause any transition out of this state.

- (E28) STSI Received: This is an external event caused by the reception of the TransferSTSI operation. It does not cause any transition out of this state.
- (E31) Unbind Received: This is an external event caused by the reception of an IN-Unbind operation from the Supporting SCF. It causes a transition to the "Idle" state.
- (E35) Request Announcement: This is an external event caused by the reception of the ProvideAnnouncementRequest operation for providing announcements to users. It does not cause any transition out of this state.

6.2.5 State 5: "Preparing Additional Information"

In this state, the SCF is preparing additional information for the supporting SCF so that it can be assisted in the processing of the call. Three events are considered in this state:

- (e11) Additional_Information_Provided_to_Supporting_SCF: This is an internal event. The SCF has collected all the information needed from the supporting SCF and sends the result to the previously issued operation requesting additional information. This event causes a transition to State 4, "Assisted Mode". It causes either the return result of one of the following operations to be issued to the supporting SCF:
 - result of ProvideUserInformation;
 - result of NetworkCapability;
 - result of RunUserScript;
 or the sending of a TransferSTSI operation.
- (e12) End_Assist: This is an internal event caused by the need of the service logic to stop its cooperation with the supporting service logic. This event causes a transition back to the State 7, "Preparing SCF Unbind Request".
- (E29) Unbind Received: This is an external event caused by the reception of an IN-Unbind operation from the Supporting SCF. It causes a transition to the "Idle" state.

6.2.6 State 7: "Preparing SCF Unbind Request"

In this state, the SCF is preparing to send a IN-Unbind operation, to terminate the relationship with the supporting SCF. It causes the following event:

- (e17) SCFUnbind Request: This is an internal event that occurs when IN-Unbind operation is sent. This closes the relationship and causes a transition back to State 1, "Idle".

6.2.7 State 8: "Processing SCF Bind"

In this state, the SCF is processing SCFBind operation. The following events are considered in this state:

- (e28) SCFBind Refused: This is an internal that occurs when the controlling SCF does not establish a relationship with the supporting SCF. It causes an SCFBind error to be sent to the supporting SCF. This event causes a transition out of this state to State 1, "Idle".
- (e29) Send positive SCF Bind result: This is an internal event causing the sending of a positive SCFBind result. It does not cause a state transition.
- (e30) SCFBind Accepted & Initiate Call Request Received: This is an internal event caused by the fact that the SCFBind operation is accepted and that an InitiateCallRequest operation has been received. It does not cause any operation to be sent. It causes a transition to "Assisted Mode" state.
- (E33) SCFUnbind Request: This is an external event caused by the reception of a request from supporting SCF to end the relationship through IN-Unbind operation. This event causes a transition back to State 1, "Idle".

- (E34) Request from supporting SCF: this is an external event caused by the reception of InitiateCallRequest operation. The InitiateCallRequest operation is queued since the controlling SCF service logic is involved in the SCFBind processing (it will be processed as soon as the controlling SCF FSM moves to "Assisted Mode" state). It does not cause a transition out of the state.

6.3 Supporting SCF FSM (SCSM-Sup)

The Finite State Machine for an SCF interacting with another SCF when acting as a Supporting SCF is depicted in Figure 6.

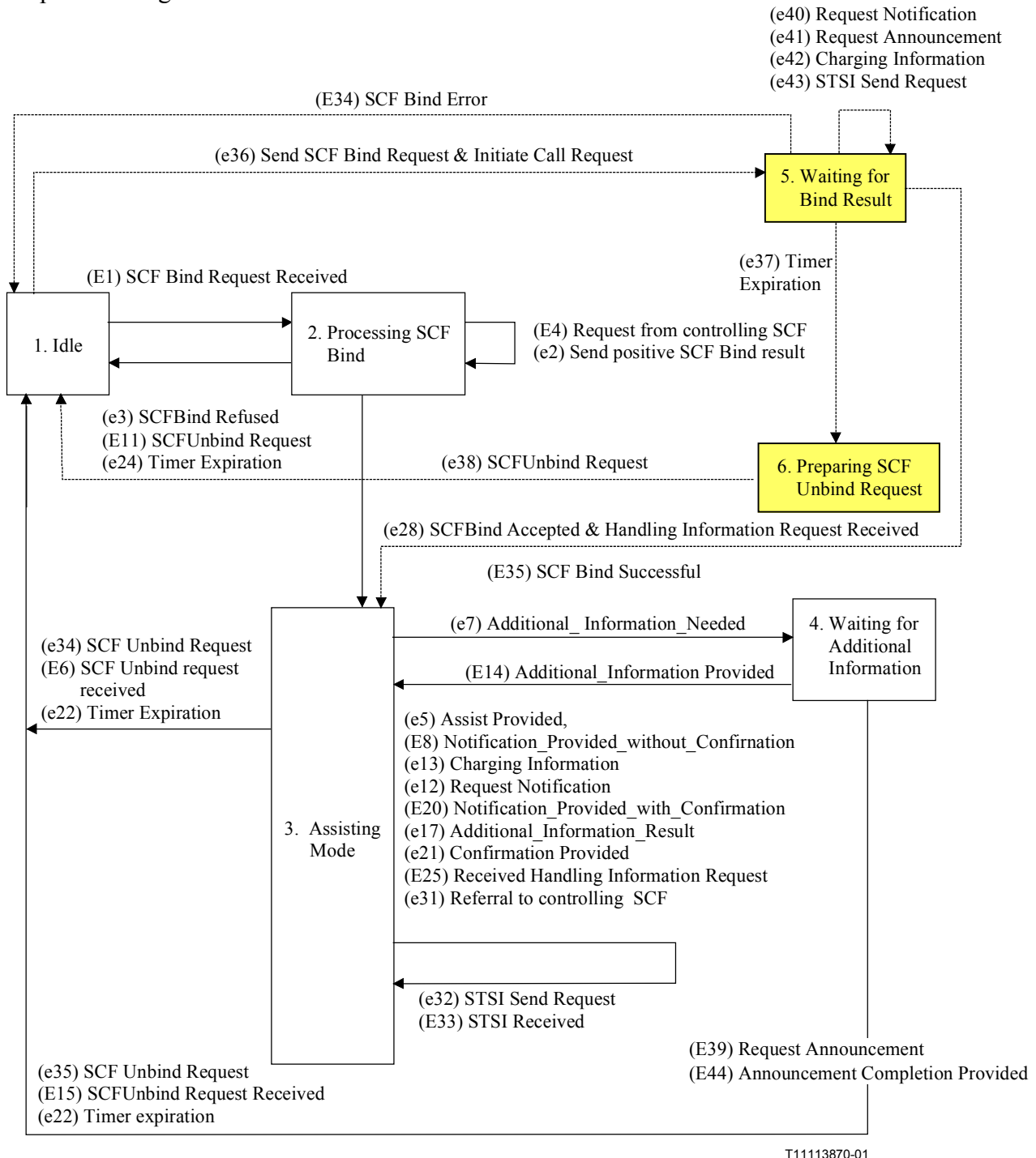


Figure 6/Q.1248.6 – SCSM-Sup (Supporting SCF FSM)

6.3.1 State 1: Idle

In this state, the SCF is waiting for request from other SCFs. No SLPI is started yet. Only the following events are accepted in this state:

- (e36) Send SCF Bind Request & Initiate Call Request: This is an internal event, caused by the need of the service logic to establish a relationship with controlling SCF to further proceed with a call. This event causes SCFBind operation and InitiateCallRequest operation to be issued to the controlling SCF. A TransferSTSI operation may also be sent simultaneously. This event causes a transition to State 5, "Waiting for Bind Result."
- (E1) SCF Bind Request Received: This is an external event caused by the reception of a SCFBind request operation from the controlling SCF for providing assistance in the processing of the call. This event causes a transition out of this state to State 2, "Processing SCFBind".

6.3.2 State 2: "Processing SCF Bind"

In this state, the SCF is processing SCFBind operation. The following events are considered in this state:

- (e2) Send positive SCF Bind result: This is an internal event causing the sending of a positive SCFBind result. It does not cause a state transition.
- (e3) SCFBind Refused: This is an internal that occurs when the supporting SCF does not establish a relationship with the controlling SCF. It causes an SCFBind error to be sent to the controlling SCF. This event causes a transition out of this state to State 1, "Idle".
- (e24) Timer Expiration: This is an internal event caused by guard timer expiration. It causes a transition back to State 1, "Idle".
- (E4) Request from controlling SCF: This is an external event caused by the reception of HandlingInformationRequest operation. The HandlingInformationRequest operation is queued since the supporting SCF service logic is involved in the SCFBind processing (it will be processed as soon as the supporting SCF FSM moves to Assisting Mode state). It does not cause a transition out of the state.
- (e28) SCFBindAccepted & Handling Information Request Received: This is an internal event caused by the fact that the SCFBind operation is accepted and that a HandlingInformationRequest operation has been received. It does not cause any operation to be sent. It causes a transition to Assisting Mode state.
- (E11) SCFUnbind Request: This is an external event caused by the reception of a request from controlling SCF to end the relationship through IN-Unbind operation. This event causes a transition back to State 1, "Idle".

6.3.3 State 3: "Assisting Mode"

In this state, the SCF is sending operations to provide assistance to the controlling SCF and receives indications from the controlling SCF. The following events are considered in this state.

- (e5) Assist_Provided: This is an internal event caused by the sending of a response to the assistance request previously received from the controlling SCF, provided that the SCF has not foreseen any further assistance. There is no state transition. It causes the following operation to be issued to the controlling SCF:
 - HandlingInformationResult.
- (E6) SCF Unbind request received: This is an external event caused by the reception of an IN-Unbind operation from controlling SCF. It gives an indication from the controlling SCF that the SCF-SCF relationship needs to be ended. This event causes a transition back to State 1, "Idle".

- (e7) Additional_Information_Needed: This is an internal event caused by the need of the service logic to receive additional information from the controlling SCF to provide assistance. This event causes a transition out of this state to State 4, "Waiting for Additional Information". It causes one of the following operations to be issued to the controlling SCF:
 - ProvideUserInformation;
 - NetworkCapability;
 - RunUserScript.
- (E8) Notification_Provided_without_Confirmation: This is an external event caused by the receipt of the notification which was requested to the controlling SCF. This event causes a transition to the same state, State 3, "Assisting Mode". This event is caused by a reception of the following operations:
 - ReportChargingInformation;
 - NotificationProvided.
- (E20) Notification_Provided_with_Confirmation: This is an external event caused by the reception of one of the following operations:
 - ConfirmedReportChargingInformation;
 - ConfirmedNotificationProvided.

This event does not cause a transition out of this state.
- (e12) Request Notification: This is an internal event caused by the sending of a RequestNotification-operation to the controlling SCF. This event causes a transition to the same state, State 3, "Assisting Mode".
- (e13) Charging Information: This is an internal event caused by the sending of a EstablishChargingRecord operation to the controlling SCF. This event causes a transition to the same state, State 3, "Assisting Mode".
- (e21) Confirmation Provided: This is an internal event caused by the need of the service logic to send confirmation of the previously received operation. It causes one of the following responses to be issued to the controlling SCF:
 - Return Result of ConfirmedReportChargingInformation;
 - Return Result of ConfirmedNotificationProvided.

This event does not cause a transition out of the "Assisting Mode" state.
- (e17) Additional_Information_Result: This is an internal event caused by the sending of a response to the previously received request from the controlling SCF. It causes the following operation to be issued to the controlling SCF:
 - HandlingInformationResult.

This event does not cause a transition out of this State 3, "Assisting Mode".
- (e22) Timer Expiration: This is an internal that occurs when no operation has been received from the controlling SCF for an appropriate period of time. The supporting SCF determines that the relation is no longer in existence and moves back to "Idle" state.
- (E25) Received Handling Information Request: This is an external event caused by the reception of a new HandlingInformationRequest operation. It can be accepted only if there is no previous HandlingInformationResult operation pending. This event does not cause a state transition out of this state.
- (e31) Referral to controlling SCF: This is an internal event caused by the decision to instruct the controlling SCF to send the pending HandlingInformationRequest to another SCF for processing. A Referral error for the HandlingInformationRequest operation is sent to the controlling SCF. It does not cause a transition out of "Assisting Mode" state.

- (e32) STSI Send Request: This is an internal event caused by the need of the service logic to request additional service information from the controlling SCF or respond the requested additional service information to the controlling SCF. It causes the following operation to be sent to the controlling SCF:
 - TransferSTSI.
 This internal event will not cause any transition out of this state.
- (E33) STSI Received: This is an external event caused by the reception of the TransferSTSI operation. It does not cause any transition out of this state.
- (e34) SCF Unbind Request: This is an internal event that occurs when an IN-Unbind operation is sent.
- (e39) Request Announcement: This is an internal event caused by the sending of a ProvideAnnouncementRequest operation to the controlling SCF for requesting to provide announcements to users. It does not cause any transition out of this state.
- (E44) Announcement Completion Provided: this is an external event caused by the receipt of AnnouncementCompletionReport operation from the controlling SCF. This event causes a transition to the same state, State 3, "Assisting Mode".

6.3.4 State 4: "Waiting for Additional Information"

In this state, the SCF waits for information to be provided by the controlling SCF. This information should help the SCF to provide assistance to the controlling SCF. The following four events are considered in this state:

- (E14) Additional_Information_Provided: This is an external event caused by the reception of the response to a previously issued operation requesting further information. This event causes a transition out of this state to State 3, "Assisting mode". This event is caused by the reception of one of the following operations return result:
 - Return Result of ProvideUserInformation.
 - Return Result of NetworkCapability.
 - Return Result of RunUserScript.
- (E15) SCF Unbind Request Received: This is an external event caused by the reception of an IN-Unbind operation from controlling SCF. It gives an indication from the controlling SCF that the SCF-SCF relationship needs to be ended. This event causes a transition back to State 1, "Idle".
- (e22) Timer Expiration: This is an internal that occurs when no operation has been received from the controlling SCF for an appropriate period of time. The supporting SCF determines that the relation is no longer in existence and moves back to "Idle" state.
- (e35) SCF Unbind Request: This is an internal event that occurs when an IN-Unbind operation is sent.

6.3.5 State 5: "Waiting for Bind Result"

In this state, the SCF is waiting the result to Bind request. The following events are considered in this state:

- (E34) SCF Bind Error: This is an external event caused by the reception of the error result of the previously issued SCFBind operation. It causes a transition back to State 1, "Idle".
- (E35) SCF Bind Successful: This is an external event caused by the reception of the successful result of the previously issued SCFBind operation. It causes a transition to State 3, "Assisting Mode".
- (e37) Timer Expiration: This is an internal event caused by the expiration of a guard timer. It causes a transition to State 6, "Preparing SCF Unbind Request."

- (e40) Request Notification: This is an internal event caused by the sending of a RequestNotification operation to the controlling SCF. It does not cause any transition out of this state.
- (e41) Request Announcement: This is an internal event caused by the sending of a ProvideAnnouncementRequest operation to the controlling SCF for requesting to provide announcements to users. It does not cause any transition out of this state.
- (e42) Charging Information: This is an internal event caused by the sending of a EstablishChargingRecord operation to the controlling SCF. It does not cause any transition out of this state.
- (e43) STSI Send Request: This is an internal event caused by the need of the service logic to request additional service information from the controlling SCF. It causes the following operation to be sent to the controlling SCF:

- TransferSTSI.

This internal event will not cause any transition out of this state.

6.3.6 State 6: "Preparing SCF Unbind Request"

In this state, the SCF is preparing to send an IN-Unbind operation, to terminate the relationship with the controlling SCF. It causes the following event:

- (e38) SCFUnbind Request: This is an internal event that occurs when an IN-Unbind operation is sent. This closes the relationship and causes a transition back to the State 1, "Idle."

6.4 SCF state transition models for chaining initiation (SCSM-ChI)

The Finite State Machine for an SCF interacting with another SCF when acting as a chaining initiator is depicted in Figure 7.